



# HORIZON EUROPE



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## THE EU RESEARCH & INNOVATION PROGRAMME

2021 – 2027

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**HÉLÈNE CHRAYE**  
DEPUTY DIRECTOR CLEAN PLANET, HEAD OF UNIT,  
CLEAN ENERGY TRANSITION, DG RESEARCH &  
INNOVATION

HE LAUNCH EVENT ISTANBUL

21 MARCH 2022

CLIMATE, ENERGY AND MOBILITY

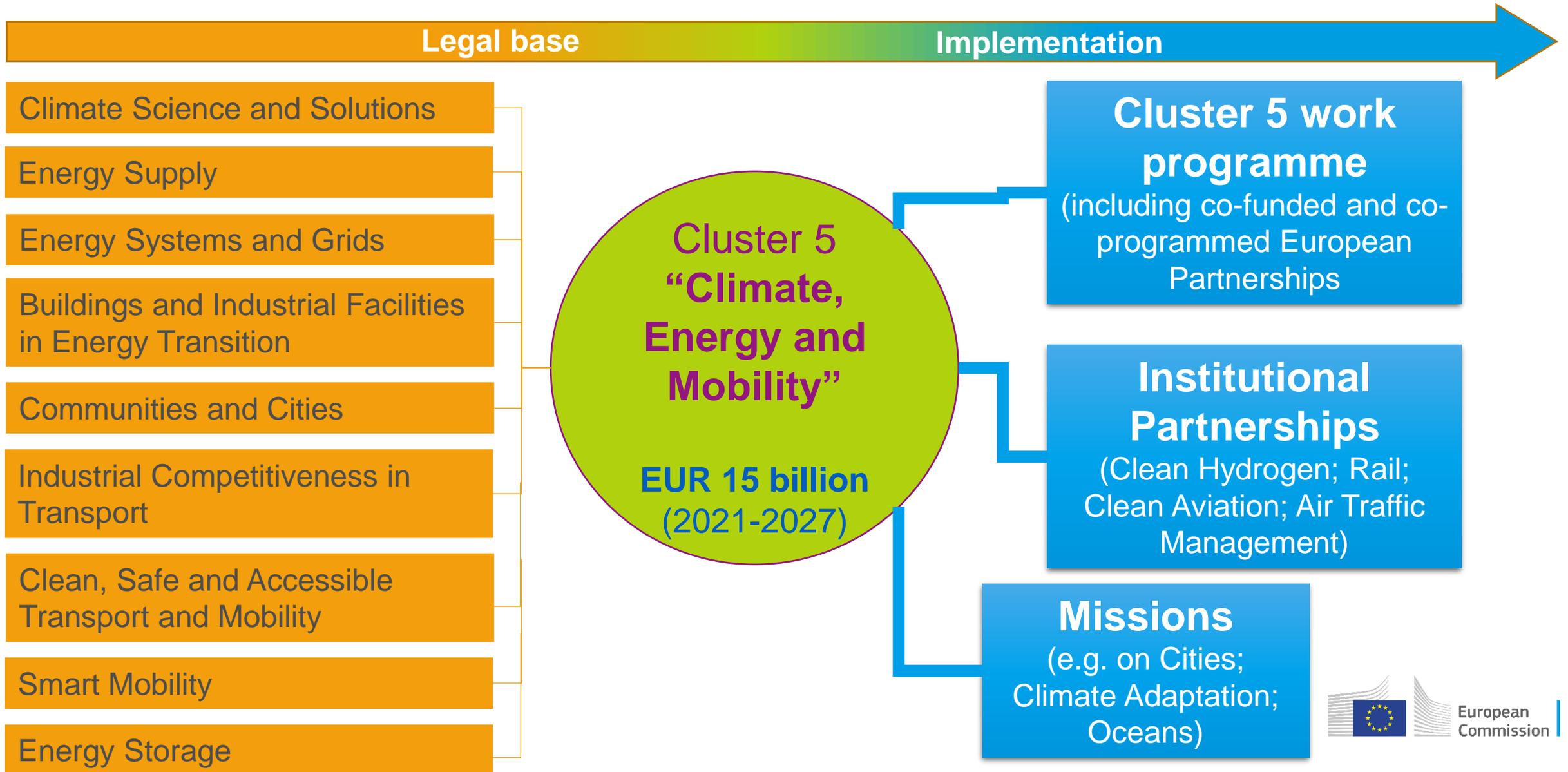


# Cluster 5

# Work programme 2021-2022



# Cluster 5 - overview



# EU Policy priorities

## European Green Deal

- Climate Action; Clean Energy; Sustainable Mobility; Eliminating pollution; Building and renovating; Biodiversity; Sustainable Industry

## A Europe fit for the digital age

- Artificial Intelligence; European data strategy; European Industrial Strategy; Cybersecurity

## An economy that works for the people

- Internal market; Jobs, Growth and investment

## Promoting our European way of life

- European Security Union; European Health Union

## A stronger Europe in the world

- International partnerships; Trade policy; EU Foreign policy

## A new push for European Democracy

- Strategic foresight; Future of Europe

## Recent Commission initiatives:

### Climate Action

- EU Climate Law (EU climate neutral by 2050)
- 2030 Climate Target Plan (55% GHG reduction by 2030)
- Make sectoral legislation 'fit for 55'
- EU Climate Adaptation Strategy
- Zero Pollution Action Plan

### Energy

- EU Strategy for Energy System Integration
- Hydrogen strategy
- Renovation wave for Europe
- Offshore renewable energy
- REpowerEU

### Mobility

- Sustainable and Smart Mobility Strategy

### Research and Innovation

- A new European Research Area

# Clean energy – Latest Policy Impacts

- Current geopolitical events stress - even further - crucial importance of energy security
- **REPowerEU** Communication:
  - Developing further the value chain for clean energy technologies
  - Tackling strategic dependencies
  - Channelling financing to next-generation technologies

# Clean energy – International Collaboration

## 2 main focuses

- **Mission Innovation** as forum for collaboration with international partners
- **Africa: AU-EU High Level Policy Dialogue** on Science, Technology and Innovation as framework for collaboration in particular within the Climate Change and Sustainable Energy partnership

# Cluster 5 Partnerships

## Institutional Partnerships

- Transforming Europe's rail system
- Integrated Air Traffic Management
- Clean Aviation
- Clean Hydrogen

## Co-funded Partnerships

- Driving urban transitions to a sustainable future (DUT)
- Clean Energy Transition

## Co-programmed Partnerships

- Built4People | People-centric sustainable built environment
- Towards zero-emission road transport (2ZERO)
- Batteries: Towards a competitive European industrial battery value chain for stationary applications and e-mobility
- Zero-emission waterborne transport
- Connected, Cooperative and Automated Mobility (CCAM)

## Clean energy – Co-fund partnership

- It is necessary to promote collaboration on clean energy innovation R&I
- **SET Plan** as main European tool to align policies and funding - Supported by the Clean Energy Transition European Partnership (**CETP**) (Turkey active member) – First calls for proposals expected in Fall 2022

# New Clean Hydrogen JU

- Priority on two pillars: production & storage and distribution
  - EUR 2Bn public/private investment
  - HE Cluster 5 allocates EUR 50 million from the 2022 budget + EUR 150 million until 2025 to the **Catalyst** Programme, which includes clean H2 among 4 priorities
- **Synergies with partnerships dealing with hydrogen applications**, including through joint calls, coordinated calls, subsequent calls – Structured collaborations with zero emission road, waterborne, railway, clean aviation, processes for the planet, clean steel.

# Clean Hydrogen JU governing structure



## Advisory bodies:

- **States Representatives Group:** members appointed | 19 Jan 1<sup>st</sup> meeting
  - 60 participants from 25 EU MS + Associated countries (Georgia, Israel, Turkey, Norway)
  - Romania elected Chair - Belgium & France Vice-Chairs
- **Stakeholders Group:** members selected & appointed | 9 February 1<sup>st</sup> meeting
  - 26 associations selected: EU geographical coverages to be improved and not all sectors well represented (gaps in production)
  - Gender balance: 6 out of 13 main candidates females (i.e. 46.2%)
  - In total: 10 out of 26 candidates – first & alternate - are females (i.e. 38.5%)
  - **Revision in one year**
- **Yearly scientific gathering within the Hydrogen Week**

# Clean Hydrogen JU SRIA priorities matched by the current AWP 2022



## SRIA Scientific priorities and 2022 AWP budget

- Renewable Hydrogen production
- Hydrogen storage and distribution
- Hydrogen end uses:
  - Transport applications
  - Clean heat and power
  - **Cross-cutting activities** including Hydrogen Valleys

## Annual WP 2021-2022:

- Adopted end of February 2022
- Call published 1 March 2022 two cut off dates: 31 May & 20 Sept. 2022

# International Cooperation SRIA priorities



**Support the Commission**, including through technical expertise, in its international initiatives on the hydrogen strategy:

- International Partnership for Hydrogen Economy and fuel cells in the Economy (**IPHE**)
- **Mission Innovation** (Clean Hydrogen Mission)
- Clean Energy Ministerial (**CEM**) Hydrogen Initiative

**Contribute to the development of regulations and standards** – elimination of barriers, supporting interchangeability, inter-operability, and trade across the internal market and globally

- International Energy Agency (IEA) Hydrogen Technology Collaboration Programme (**HTCP**)

**Support strengthening EUs cooperation with Africa** – green H2 win-win

# ERA action 11 (hydrogen and SET Plan)/1

## ERA Pilot on Green Hydrogen:

- Joint work of MS and Commission in the agenda process for the ERA Pilot, in accordance with Council conclusions – Joint ERA Pilot SRIA
- Commission issued Staff Working Document on “Building a European Research Area for clean hydrogen - role of EU R&I investments to deliver on EU’s Hydrogen Strategy”:
  - Getting an overview on related EU R&I initiatives
  - Identifying improvements needed
  - Developing synergies with Member States’ part of the agenda process on R&I pilot on Hydrogen

## Work will continue with:

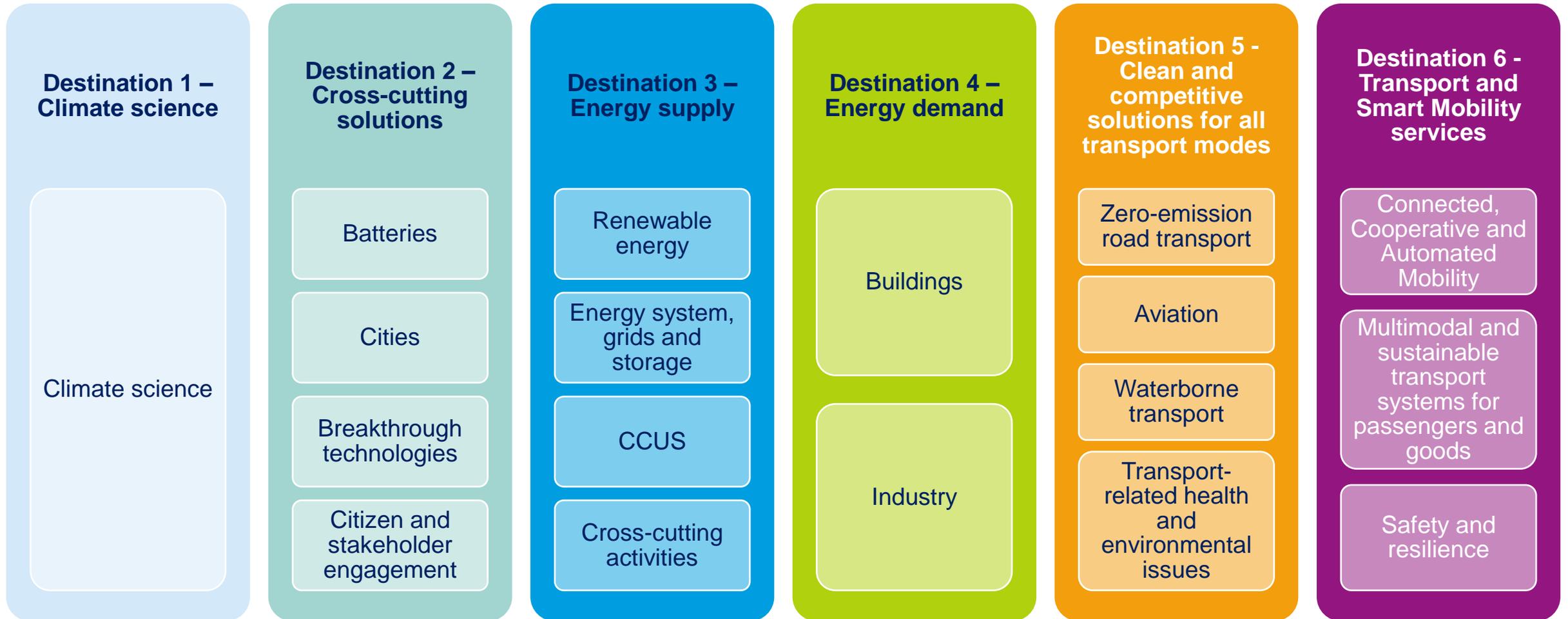
- Processing implementation coming from the SWD
- Completing SRIA and designing roadmap (MS and Commission)

# ERA action 11 (hydrogen and SET Plan)/2

SET Plan: “strategic policy framework enhancing MS cooperation in energy transition”

- **Implementation Working Groups (IWG)**, each of them with objectives, indicators and milestones
- **EERA: European Energy Research Alliance** / joint programming
- **ETIPs**: involving industry
- Powerful and successful, however SET Plan needs **revision** in order to:
  - Support the Green Deal policies and strategies (incl. hydrogen)
  - Support the ERA Policy Agenda, benefit from its frame and reinforce synergies with MS
  - Become more agile and policy driven

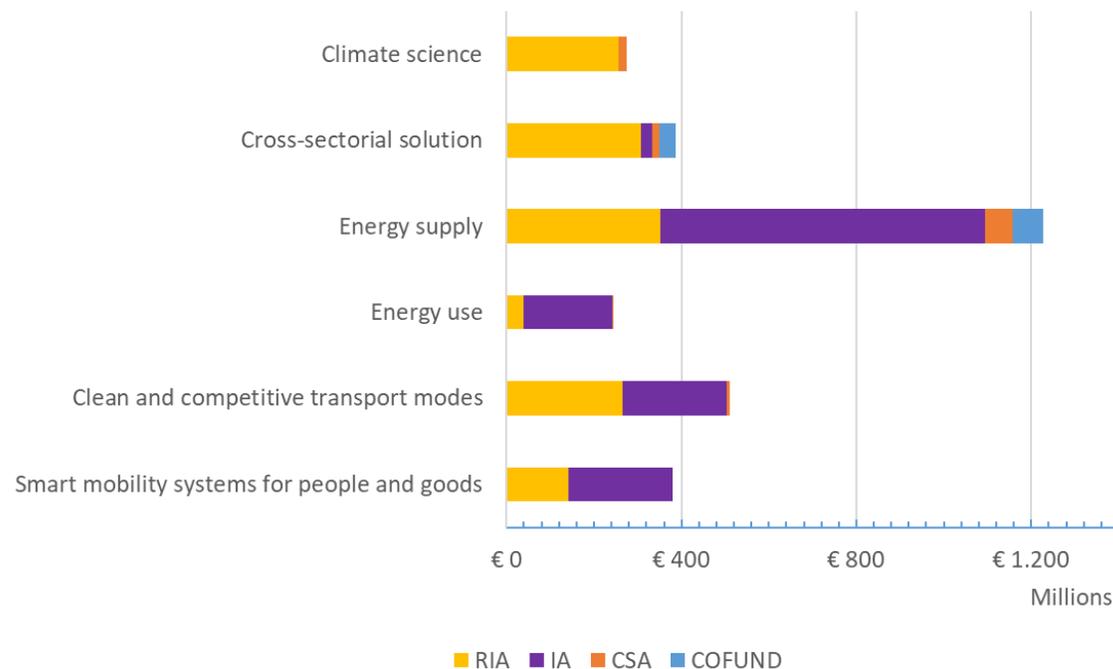
# Cluster 5 Work programme - overview



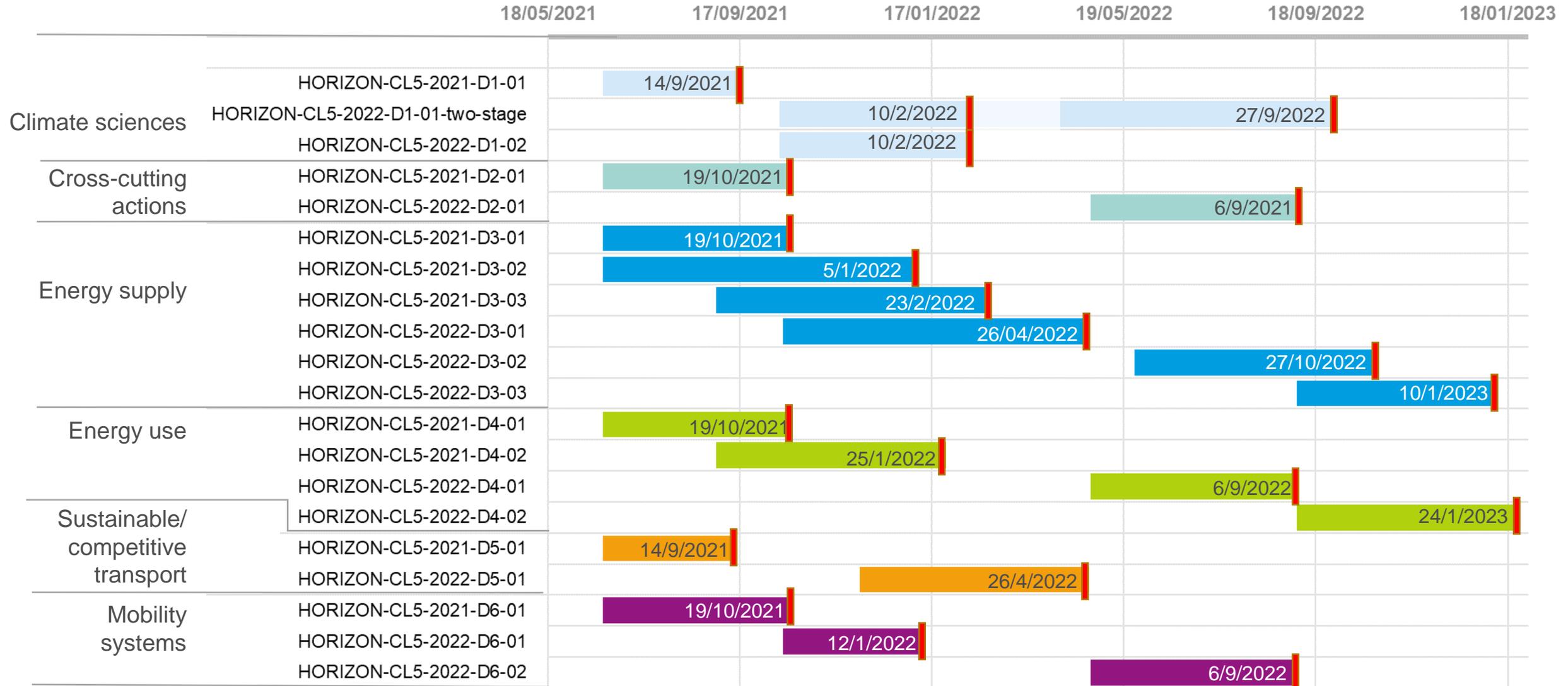
# Cluster 5 Work programme 2021-22 - overview

	Budget (Mio €)	Share of total	Number of topics	Share of total
Climate science	274.0	9%	17	9%
Cross-sectorial solution	387.5	13%	25	13%
Energy supply	1226.3	40%	67	36%
Energy use	244.0	8%	18	10%
Clean and competitive transport modes	511.0	17%	31	17%
Smart mobility systems for people and goods	380.0	13%	28	15%
<b>TOTAL</b>	<b>3022.8</b>		<b>186</b>	

EU contribution per Destination and type of action (2021-2022, in Mio EUR)



# Cluster 5 call structure



# Destination 1 – Climate science

## Objectives

- **Advancing knowledge and providing solutions** in earth system science
- Contributing substantially to key **international assessments**, e.g. Intergovernmental Panel on Climate Change (IPCC), European Environment Agency
- Strengthening the **European Research Area** on climate change
- Increasing the **transparency, robustness, trustworthiness and practical usability** of the knowledge base on climate change for use by policy makers, practitioners, other stakeholders and citizens



## Issues covered in topics 2021-2022

- Earth system science, analysis of pathways leading to carbon neutrality, adaptation and climate services, social sciences to tackle climate change, climate eco-system interactions

## Implementation

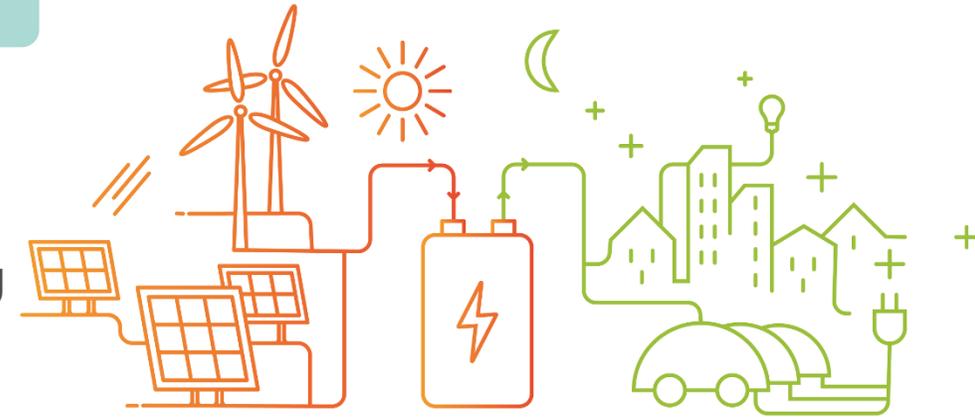
- 1 call in 2021 – 9 topics (total budget: 136 M€)
- 2 calls in 2022 – 8 topics (total budget: 138 M€)

# Destination 2 - A competitive and sustainable European battery value chain



## Objectives

- Nurturing a world-class European research and innovation ecosystem on batteries along the **value chain** based on sustainable pathways. It includes improvement of **technological performance** to increase **application user attractiveness** (in particular in terms of safety, cost, user convenience, fast charging and environmental footprint), in parallel supporting the creation of a **competitive, circular, and sustainable European battery manufacturing value chain**



## Issues covered in topics 2021-2022

- Raw material processing, advanced materials, recycling technologies, Li-ion batteries, solid state batteries, new generation technologies, manufacturing technologies, smart functionalities, testing, battery management, coordination activities

## Implementation

- **2021:** 7 topics (total budget: 160 M€)  
**2022:** 10 topics (total budget: 133 M€)

All topics contribute to the **European Partnership “Towards a competitive European industrial battery value chain for stationary applications and e-mobility”**

([https://ec.europa.eu/energy/topics/technology-and-innovation/batteries-europe/news-articles-and-newsletters/batteries-ppp\\_en](https://ec.europa.eu/energy/topics/technology-and-innovation/batteries-europe/news-articles-and-newsletters/batteries-ppp_en))

# Destination 2 - Emerging breakthrough technologies and climate solutions

## Objectives

- Emergence of **unanticipated technologies** enabling emerging zero-greenhouse gas and negative emissions in energy and transport;
- Development of **high-risk/high return** technologies to enable a transition to a net greenhouse gas neutral European economy;
- Explore environmental, social and economic **impacts**, possible **regulatory needs**, and **value chains**

## Issues covered in topics 2021-2022

- Methane cracking, non-CO2 greenhouse gases removal, direct atmospheric carbon capture and conversion, bottom-up

## Implementation

- **2021**: 4 topics (total budget: 35 M€)



# Destination 2 - Citizens and stakeholder engagement

## Objectives

- A better understanding of the **societal implications** of the climate transition, including its distributional repercussions;
- More effective **policy interventions**, co-created with target constituencies and building on high-quality policy advice;
- Greater **societal support** for transition policies and programs, based on greater and more consequential involvement of those most affected.

## Issues covered in topics 2021-2022

- Just transition, SSH platform, Transition Super Labs, NCP-network

## Implementation

- **2021**: 4 topics (total budget: 17.5 M€)



# Destination 2 – Communities and cities

## Objectives

- **Increased efficiency** of Europe's cities' and communities' **energy, resource use and mobility patterns** and cities' and communities' **overall sustainability**, thereby improving their **climate-resilience and attractiveness** to businesses and citizens in a holistic fashion.

## Issues covered in topics 2021-2022

- European co-funded Partnership; CIVITAS network

## Implementation

- Implemented also through co-funded Partnership **Driving Urban Transition**
- **2 topics** in 2021-2022



# Destination 3 – Renewable energy

## Objectives

- Fostering European **global leadership** in affordable, secure and sustainable renewable energy technologies and services by improving their **competitiveness** in global value chains and their position in growth markets, notably through the **diversification of the renewable services and technology portfolio**

## Issues covered in topics 2021-2022

- Solar energy, wind energy, biofuels, geothermal energy, hydro energy, CHP, energy carriers
- Disruptive technologies, cost reduction, improved efficiency, de-risking, integration, export potential, sustainability, market uptake

## Implementation

- **2021: 20 topics** (total budget: 335 M€)
- **2022: 24 topics** (total budget: 368 M€)



# Destination 3 – Energy systems, grids and storage

## Objectives

- Ensuring cost-effective **uninterrupted and affordable supply of energy** to households and industries in a scenario of **high penetration of variable renewables** and other new low carbon energy supply.
- Managing **smart and cyber-secure energy grids** and optimisation the **interaction** between producers, consumers, networks, infrastructures and vectors.

## Issues covered in topics 2021-2022

- Energy sector integration; energy system planning and operation; grid resilience and reliability; power electronics; active consumer; markets and energy communities; digitization; thermal energy storage

## Implementation

- **2021: 10 topics** (total budget: 152 M€)
- **2022: 7 topics** (total budget: 181 M€)



# Destination 3 – Carbon Capture, Utilization and Storage (CCUS)

## Objectives

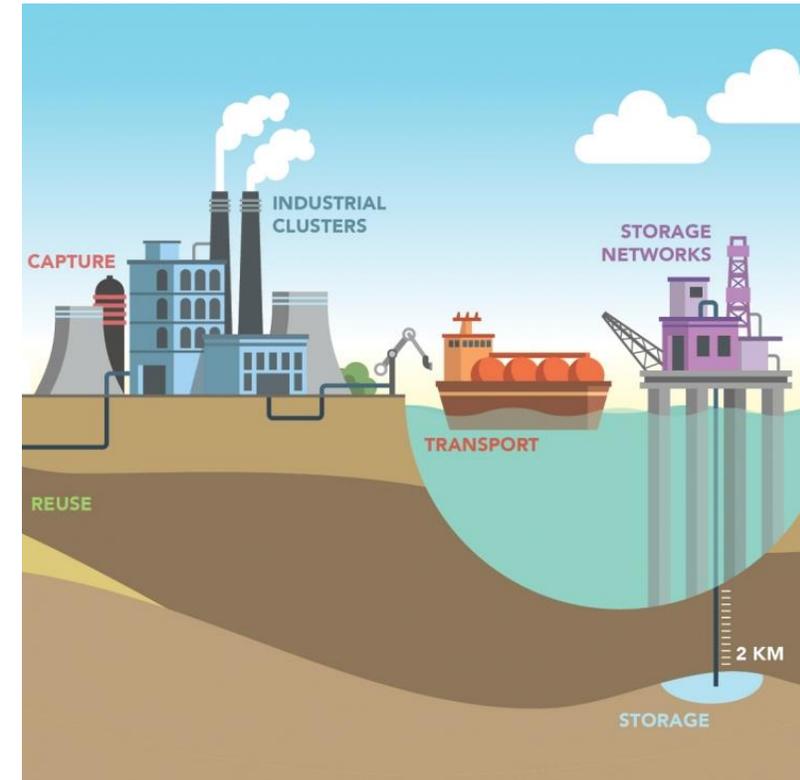
- Accelerating the development of Carbon Capture, Use and Storage (CCUS) as a CO<sub>2</sub> emission mitigation option in **electricity generation and industry applications** (including also conversion of CO<sub>2</sub> to products)

## Issues covered in topics 2021-2022

- CCUS hubs, application in industry, CO<sub>2</sub> capture

## Implementation

- **2021: 2 topics** (total budget: 32 M€)
- **2022: 1 topics** (total budget: 58 M€)



# Destination 4 – Highly energy-efficient and climate neutral EU building stock

## Objectives

- Technological and socio-economic breakthroughs for achieving **climate neutrality** and the transition to **zero pollution** of the **building stock by 2050**, based on **inclusive and people-centric R&I**

## Issues covered in topics 2021-2022

- Energy performance assessment and monitoring, industrialization of deep renovation, integrated technology solutions, prefabricated renovation packages, demand response, renewable intensive homes, smart buildings, design, materials, sustainability of life-cycle

## Implementation

- **2021: 6 topics** (total budget: 74 M€)
- **2022: 10 topics** (total budget: 140 M€)

Many topics contribute to the European Partnership  
“*People-centric, Sustainable Built Environment*”  
(*Built4People*)”



# Destination 4 – Industrial facilities in the energy transition

## Objectives

- Increased energy efficiency in industry and reducing industry's Greenhouse Gas (GHG) and air pollutant emissions through **recovery, upgrade and/or conversion of industrial excess (waste) heat** and through **electrification of heat generation**.

## Issues covered in topics 2021-2022

- Heat upgrade technologies; heat-to-power conversion; high temperature thermal storage

## Implementation

- **2021: 2 topics** (total budget: 30 M€)
- **2022: 2 topics** (total budget: 18 M€)



# Destination 5 – Zero-emission road transport

## Objectives

- Transforming **road transport to zero-emission mobility** through a world-class European research and innovation and industrial system, ensuring that Europe remains world leader in innovation, production and services in relation to road transport (more detailed information below).

## Issues covered in topics 2021-2022

- Regional medium freight haulage, power electronics, optimised smart EV charging, sustainable circularity, heavy duty vehicles, busses

## Implementation

- **2021: 4 topics** (total budget: 94 M€)
- **2022: 4 topics** (total budget: 105 M€)



All topics contribute to the **European Partnership “Towards zero emission road transport’ (2ZERO)”**

([https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility_en))

# Destination 5 – Aviation

## Objectives

- Accelerating the **reduction of all aviation impacts and emissions** (CO<sub>2</sub> and non-CO<sub>2</sub>, including manufacturing and end-of-life, noise), developing aircraft technologies for deep reduction of greenhouse gas emissions, and **maintaining European aero-industry's global leadership** position

## Issues covered in topics 2021-2022

- Long-term research, silent and ultra-low local air pollution aircraft, digital aviation technologies, policy-related research

## Implementation

- **2021: 2 topics** (total budget: 54 M€)
- **2022: 3 topics** (total budget: 45 M€)

Substantial activities are funded under the Institutional European Partnerships “**Clean Aviation**” (<https://clean-aviation.eu/>) and “**Air Traffic Management**”.



# Destination 5 – Waterborne Transport

## Objectives

- Accelerate the development and prepare the deployment of **climate neutral and clean solutions** in the shipping sector, **reduce its environmental impact** (on biodiversity, noise, pollution and waste management), improve its **system efficiency**, leverage digital and EU satellite-navigation solutions and contribute to the **competitiveness** of the European waterborne sector

## Issues covered in topics 2021-2022

- climate neutral fuels, electrification, energy efficiency and drastically lower fuel consumption of vessels, port infrastructure, inland waterway vessels, automated shipping

## Implementation

- **2021: 8 topics** (total budget: 93 M€)
- **2022: 6 topics** (total budget: 96 M€)



Most topics contribute to the **European Partnership “Zero Emission Waterborne Transport (ZEWT)”**

([https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility_en))

# Destination 5 – Impact of transport on environment and human health

## Objectives

- Devising more effective ways for **reducing emissions and their impacts** through improved scientific knowledge

## Issues covered in topics 2021-2022

- retrofit solutions for tailpipe and brake polluting emissions, noise and particle emissions, smog prevention

## Implementation

- **2021: 2 topics** (total budget: 15 M€)
- **2022: 1 topics** (total budget: 7 M€)



# Destination 6 – Connected, cooperative and automated mobility (CCAM)

## Objectives

- Accelerating the implementation of innovative **connected, cooperative and automated mobility (CCAM)** technologies and systems for passengers and goods

## Issues covered in topics 2021-2022

- On-board perception and decision-making technologies; safety validation; Physical and Digital Infrastructure; cyber-security; socio-economic and environmental impacts; coordination; demonstrators; occupant protection; human behavioural model; fleet and traffic management systems; Artificial Intelligence

## Implementation

- **2021: 6 topics** (total budget: 74 M€)
- **2022: 5 topics** (total budget: 88 M€)



All topics contribute to the **European Partnership “Connected, Cooperative and Automated Mobility (CCAM)”**  
([https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-climate-energy-and-mobility_en))

# Destination 6 – Multimodal and sustainable transport systems

## Objectives

- Further developing a **multimodal transport system** through sustainable and smart long-haul and urban freight transport and **logistics**, upgraded and resilient physical and digital **infrastructures** for smarter vehicles and operations, for optimised system-wide network efficiency

## Issues covered in topics 2021-2022

- multimodal freight transport nodes; greening the last mile; transport infrastructure (inland waterways); logistics networks integration and harmonisation; urban logistics and planning; smart enforcement; mobility services for the next decade; multimodal network and traffic management; construct, maintain and decommission transport infrastructure; resilient freight transport and logistics networks

## Implementation

- **2021: 3 topics** (total budget: 53 M€)
- **2022: 7 topics** (total budget: 91 M€)



# Destination 6 – Safety and resilience

## Objectives

- Drastically decreasing the number of **transport accidents, incidents and fatalities** towards the EU's long-term goal of moving close to zero fatalities and serious injuries by 2050 even in road transportation (Vision Zero) and increase the **resilience** of transport systems.

## Issues covered in topics 2021-2022

- Safe lightweight vehicles; human-technology interaction; road safety in low and medium income countries in Africa; vulnerable road users; infection on large passenger ships; containership fires; safe automation and human factors in aviation; resilient aircraft and increased survivability

## Implementation

- **2021: 4 topics** (total budget: 40 M€)
- **2022: 3 topics** (total budget: 34 M€)





# Thank you!

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